U.S. ENVIRONMENTAL PROTECTION AGENCY RESPONSE TO GENERAL COMMENTS RECEIVED PURSUANT TO THE NOVEMBER 27, 1990, UNILATERAL ADMINISTRATIVE ORDER FOR THE NL INDUSTRIES/TARACORP SUPERFUND SITE IN GRANITE CITY, ILLINOIS - JANUARY 1991

On December 21, 1990, a conference was held in Chicago, as requested by various parties who received the November 27, 1990, administrative order for remedial design and remedial action at the NL Industries/Taracorp Site in Granite City, Illinois (the Order). The Order was issued under the authority of section 106 of the Comprehensive Environmental Response Compensation and Liability Act, as amended, 42 U.S.C. § 9601, et seq., (CERCLA). Each party who received the Order was entitled to a conference, as stated in paragraph 77 of the order. U.S. EPA agreed to accommodate each party who requested a telephone conference, individual meeting, or the collective meeting held on December 21.[1] The purpose of the December 21 conference was to

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[1] The only comment to reflect dissatisfaction with EPA's willingness to meet with the various parties was raised by Johnson Controls, as presented by Mr. Dennis Reis in his letter to Mr. Bradley of December 20, 1990. The source of the comment is somewhat curious, since Mr. Reis was consulted before the meeting to determine if December 21 was an acceptable date. Mr. Reis stated that December 21 was acceptable and requested a morning meeting. The meeting was held at 9:00 a.m. Johnson Controls is also the only party to complain about EPA's willingness to share information, particularly a technical guidance document on lead which Johnson Controls claims in its comments was "unreasonably" withheld. Johnson Controls, through an associate of Mr. Reis, made one verbal request for the information in question and stated there was no hurry for the material. EPA called the associate when there was a delay in sending the document to Johnson Controls and was again assured there was no hurry. The document in question was presented to the representatives of Johnson Controls one day before the representatives had delivered the comments claiming the document had been unreasonably withheld.

discuss issues involving the implementation of the response actions required by the order, the extent to which Respondents intend to comply with the order, and the order's applicability to the Respondents. This letter serves as U.S. EPA's written response to the issues raised at the conference and the primary written comments received by U.S. EPA.

Several parties requested brief extensions of time to submit comments at the beginning of the meeting. U.S. EPA agreed to accept written comments until December 28, 1990, and agreed to delay the effective date of the order until January 18, 1991. The remainder of the meeting consisted of comments and/or discussion of the following points: (1) criticism by several generators who received the order that they were not provided with adequate notice of the public comment period; (2) criticism of U.S. EPA's selection of a remedy which requires the excavation and replacement of soils with concentrations equal to or greater than 500 ppm of lead; and (3) a discussion on whether tilling is an appropriate remedy at the NL Site.

Before discussion of the above points took place, government representatives asked the order recipients if they needed clarification on any provisions of the order or the scope of work attached to the order. No discussion was desired. Respondents were encouraged to raise all issues consistent with the purpose of the meeting, as defined in Section XXVI of the order. The order recipients were also asked at a later point in the meeting

whether any remedy or technology other than tilling requires discussion. No one raised additional issues for discussion.

U.S. EPA strongly believes the generators who received the order were provided with more than the required statutory period of time to comment on the selected remedy at the Site. Several of the major generators were initially made aware of the Site as far back as 1984 when they received an information request from U.S. EPA. A list of these generators is found in the Agreement and Administrative Order by Consent, U.S. EPA Docket No. V-W-85-C-006, section D, paragraph 8. This agreement required NL Industries, Inc. to perform the remedial investigation and feasibility study at the Site. The Site is also listed in the Federal Register as a National Priorities List Site. The identity of the remaining generators was unknown to U.S. EPA until October 1989. All parties identified as potentially responsible parties (PRPs) were sent notice letters in November 1989, and invited to a meeting to discuss the site in December 1989. The December meeting, among other things, provided a history of the site and discussed the remedial alternatives under consideration. Copies of technical documents were available for review and the representatives of Johnson Controls, who assumed chairmanship of the generator PRP committee, were provided with a copy of each technical document immediately upon verbal request. The December meeting also announced the anticipated schedule for future site events, including the January release of EPA's proposed plan and the opening of the public comment period. EPA

also announced its expectations that a final decision on the remedy for the site would be made in March 1990. Representatives of EPA answered all questions raised at the meeting before leaving the room to allow the PRPs to organize into a committee.

Events subsequent to the December 1989, meeting occurred in a manner consistent with how EPA informed the potentially responsible parties the events would occur. On January 10, 1990, EPA released its proposed plan and announced the beginning of a 45-day public comment period. The public comment period was then extended until March 12, 1990. Notice of a public hearing in Granite City, Illinois, on February 8, 1990, attracted approximately 250 people and newspaper, radio, and television coverage. In addition to the February 8, 1990 meeting, representatives of EPA held several availability sessions in the Granite City area and were available to all parties requesting the opportunity to discuss the proposed remedy with EPA. The above described efforts to obtain public comments go well beyond the minimum requirements of CERCLA.

The concerns raised at the December 21, 1990, meeting regarding the PRPs discontent with the remedy selected and a proposal to consider an alternate remedy (tilling) are not timely. The appropriate time for the PRPs to consider and comment on the various remediation techniques is during the preparation of the feasibility study and during the public comment period on EPA's proposed plan. Any comments questioning the remedy should have been raised during the public comment

period. U.S. EPA responded to the comments raised in a timely manner during the public comment period (See Appendix B of the Record of Decision [ROD] and the Responsiveness Summary to the comments received during the public comment period). The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) has specifically addressed the issue of comments submitted after a decision document has been signed. 40 C.F.R. § 300.825(c), "Record requirements after the decision document is signed", provides that:

> The lead agency is required to consider comments submitted by interested persons after the close of the public comment period only to the extent that the comments contain significant information not contained elsewhere in the administrative record file which could not have been submitted during the public comment period and which substantially support the need to significantly alter the response action. All such comments and any responses thereto shall be placed in the administrative record.

The comments received by NL Industries and Johnson Controls do not fulfill the requirements of 40 C.F.R. 300.825(c). Both parties had ample time to provide comments during the public comment period and have not submitted information which substantially supports the need to significantly alter the response action. Although EPA is not obligated to respond to comments challenging the Record of Decision (ROD) which are submitted outside of the public comment period and are not part of the Administrative Record for the selection of a remedy at the Site, the comments on the Order essentially challenging the ROD have been read and considered by EPA. The following is a summary

of EPA's analysis of the verbal and written comments submitted regarding EPA's selection of a remedy requiring the excavation of lead-contaminated soils of 500 ppm or greater in residential areas and the tilling remedy proposed as an alternative to excavation.

NL Industries' submittal consists primarily of a draft copy of a report from the "Lead in Soil" task force of the society for environmental geochemistry and health. EPA does not believe the report substantially supports a need to alter the response action and questions the advisability of relying on a draft version of this report.

NL Industries, in its letter of December 26, 1990, criticizes EPA for its use of modeling to support the 500 ppm cleanup level. EPA finds it curious that NL chooses to criticize the Agency for using the Integrated Uptake/Biokinetic Model (U/B Model) to support the ROD. EPA's use of the model was initially requested by NL in the comments submitted during the public comment period. A discussion of the results of EPA's initial application of the model in the version available at the signing of the ROD is found in Appendix B of the Record of Decision.

Johnson Controls submitted detailed comments challenging U.S. EPA's selection of a 500 parts per million (ppm) cleanup standard for areas which lead contaminated soil must be excavated and replaced with clean soil. The comments were prepared by a paid contractor, TRC. The comments, submitted pursuant to paragraph 79 of the order, follow comments prepared by TRC which

were submitted by Johnson Controls on August 31, 1990, which address the same topic. U.S. EPA, in a letter dated September 14, 1990, responded to Johnson Controls August 31, 1990 correspondence and discussed the misperceptions and inaccuracies of TRC's technical comments. The focus of EPA's response was a discussion of TRC's misuse of the U/B Model. The focus of the discussion below is the December, 1990, comments of Johnson Controls, as prepared by TRC. The following comments are not designed to be a point by point response to the comments of Johnson Controls, but summarize EPA's response and address some of the weaknesses in the Johnson Controls/TRC presentation.

U.S. EPA agrees with Johnson Controls that site specific factors are important in determining a proper remedy at the NL site. However, the comments do not recognize that there are many important factors that the Granite City site shares with other sites which involve the remediation of lead contaminated soil. Common factors should not be ignored, nor should the assessments of an appropriate remedy at other sites which must clean lead contaminated soils. U.S. EPA has reviewed the Marjol removal site in Throop, Pennsylvania and existing records of decisions at other Superfund sites faced with soil/lead cleanups. A review of these decisions indicates that Region V's selection of a 500 ppm cleanup standard represents the maximum acceptable level for lead in soil.

Among the factors which can be compared from site to site are the form of lead contamination and the population of people

who are or will be exposed to the contamination. It is generally accepted that lead contamination from lead smelter sites is more bioavailable than lead contamination from lead milling or mining sites and therefore poses a greater risk to the exposed human population. The bioavailability of smelter lead is higher than lead from mining sites because the smaller particle size and chemical form increase the degree of absorption in the human gut. While the NL site is a smelter site, the studies relied on by Johnson Controls are mining sites which will underestimate the risk of the lead to humans. A review of mining sites, however, indicates that EPA has determined that even these sites may warrant a 500 ppm cleanup standard for lead in residential soil. An example is found in reviewing the Sharon Steel Superfund site.

A second comparison of the various soil/lead sites involves a consideration of the population exposed to the lead which is related to their access to the contaminated material and frequency of exposure. It is generally agreed that children represent a sensitive subset of the population who are at greater risk to adverse health effects from exposure to lead. Generally, the risk at a site increases along a continuum, with an industrial site which will not become residential in the future posing less of a risk, a site which is not now but may become residential in the future posing a somewhat greater risk, and a site which includes urban residential areas posing the greatest risk. The NL site is in an urban residential area, the category which poses the greatest risk due to constant early exposure to

the population. EPA also notes that the type of community in an exposed area is significant. For example, a retirement village is less likely to have as many children (the critical subpopulation) exposed to the soil/lead contamination than a neighborhood with young children. Areas with bare areas of soil present a greater risk than areas where the soil is uniformly covered. EPA observations in the areas contaminated with lead reveal that bare patches of soil are not uncommon and that the areas in question are residential areas and neighborhoods with families, children, and parks. Again these observations place the NL site in a higher risk category than many other sites which are not residential. A review of cleanup decisions at these sites, however, reveals that even industrial areas have selected the 500 ppm cleanup standard and often a more stringent standard is established. Some sites have required cleanups down to background levels of lead, other sites have required a 200 ppm standard. The Marjol site choose a cleanup range between 200-300 ppm. All soils at this site which contain lead concentrations greater than 200-300 ppm require excavation and the replacement of the contaminated soil with clean soil. Again, this review of other sites indicates that the 500 ppm standard selected at the NL site is the maximum allowable concentration of lead in soil which may remain after excavation. Another factor considered by EPA which is characteristic of different sites is the increase in adverse health effects which would be expected due to the synergistic nature of metals in industrial areas (i.e. lead and

arsenic). The 500 ppm cleanup level was also the level independently arrived at by the State of Illinois and required for State concurrence on the Record of Decision.

TRC, in its critique of the cleanup level established by EPA, suggests that the basis of support for the cleanup level is the reports of Milar and Mushak (1982), Mielke, et al. (1988) and Shellshear (1975). They ignore the literature summaries and recommendations presented in (1) U.S. EPA OSWER Directive #9355.44-02, 1989; (2) USDHHS, Preventing Lead Poisoning in Young Children, 1985; and (3) Ontario Lead in Soils Committee, Review and Recommendations on a Lead in Soil Guideline, 1987 (OLSC), as well recommendations of other health agencies across the country including the Minnesota Pollution Control Agency and the Minnesota Department of Health, the California Department of Health Services, etc. A need for a lower cleanup level has also been echoed by individual researchers in the lead field, both in publications and personal communications, including Barltrop (1975), Yappee (1983), Bornschein (personal Communication), as well as those cited. Thus the basis for the 500 ppm soil lead cleanup level for children exposed daily in a residential setting can hardly be considered casual.

TRC attempts to discredit the Milar and Mushak (1982) study because it relates blood lead levels to house dust levels rather than to soil lead levels. In fact, they state that "the house dust level/blood lead level described ..... has very little relevance to the blood lead response to soil lead." Blood lead

studies give evidence of the importance of the contribution of outdoor soil/dust lead to blood lead levels in older children (ages 2-6) and outdoor soil/dust lead to indoor dust lead loading and blood lead levels in younger children (under age 2). The relationship between soil lead and house dust lead has been examined in great detail, as the consultants themselves attest to later in the discussion in section 2.1.4. However, in this section, they maintain that "the most important sources of dust lead appear to be unrelated to soil lead". This would suggest that homes without lead paint should have low dust lead levels. Analysis of homes at Superfund sites and in the Cincinnati Tri-City Study (remediated homes with no lead paint) have been used to derive factors for outdoor soil loading to indoor dust. Dr. Robert Elias of the U.S. EPA Office of Research and Development (ORD) has provided information on this relationship and has examined existing data at length to develop indoor dust loading factors for the updates of the Lead Uptake/Biokinetic Model (U/B Model).

Recent blood lead level studies sponsored by the Agency for Toxic Substances Disease Registry (ATSDR) at Superfund sites have included an examination of the relationship between soil lead/blood lead levels and soil lead/indoor dust lead levels. A recent example is the significant correlation between indoor floor dust lead and outdoor dust/soil lead levels reported in the Leadville Metals Exposure Study conducted by the Colorado Department of Health and ATSDR.

The ratio used in the U/B Model is an average value; the contribution of soil lead to house dust lead may well be greater in older, drafty homes, homes which use natural ventilation rather than air conditioning in summer, and homes which have increased transport of outdoor soil/dust into the home due to children and pets. These are just the conditions which exist in the Granite City Superfund site area. Thus to deny outdoor soil/dust lead as a major source of indoor lead is frivolous and misleading, as is the consideration of indoor dust lead loading from operating smelters, milling/mining sites and inner-city structures with deteriorating paint. These latter scenarios are known to give different soil lead/blood lead and soil lead/house dust lead correlations. TRC quotes Steel et al. data from mining communities its their discussion, although the differences in indoor dust loading between mining/milling sites and smelter sites is well accepted.

TRC chose to focus on house dust when considering the report of the Ontario Lead in Soil Committee (1987, doc 105). They, in fact, ignore the concluding recommendations of the committee: "a 1000 ppm guideline level is appropriate for areas to which children do not have routine access, while a guideline level between 500 and 1000 ppm is appropriate for areas to which children do have routine access". The report also includes the recommendations of the Royal Society of Canada: "for clean-up around lead-processing or lead-using plants, soil lead levels of <u>up to 500 ppm</u> are acceptable for residential areas and for

gardens and allotments, while levels of up to 1000 ppm should be acceptable for ....areas to which children have only intermittent access."

The misleading nature of TRC's presentation is further shown in their use of the above report. They cite the conclusion that "remediation of house dust lead is more important than remediation of soil lead" without further explaining the importance of the contribution of the sources of lead to the remediation or that blood lead measurements represent a snapshot in time. The temporal component is very important when examining the results of blood lead level measurements. It would be expected that when the primary source of lead dust is outdoor soil, blood lead measurements taken before the house dust lead/soil lead levels had reequilibrated would appear to indicate that remediation of house dust alone could solve the elevated blood lead problem. Unfortunately, this is not the case, and blood lead levels will rise again as house dust levels increase unless a permanent remedy, such as removal of lead contaminated soil, is undertaken.

U.S. EPA, Region V, chose not to rely on the U/B Model as the basis for recommending a 500 ppm cleanup standard when the proposed plan for the site was released because of the Model's evolving nature as a risk assessment tool. However, when public comments requested that the U/B Model be evaluated in the selection of a remedy, Region V employed the use of the U/B Model (version 2.0, the only version available at the time of the ROD)

to further evaluate the lead soil cleanup level proposed for this site. The U/B Model is primarily a risk assessment tool used to determine lead exposure and predict a distribution of blood lead levels in those exposed. When used to determine risk -- the age range of the critical exposed population, the cut-point and allowable percentage of children over the cut-point must be stipulated. U.S. EPA, Region V did not stipulate or endorse values in the application in question.

Instead, EPA used the values recommended in the comments submitted by NL Industries. Using these values, EPA demonstrated that if the U/B Model alone was relied on to determine a cleanup level for lead, approximately 8.5 percent of the exposed children under the age of six were predicted to attain blood lead levels greater than 15 micrograms per decaliter (15 ug/dl) and a more stringent cleanup standard than EPA recommended would be mandated.

Johnson Controls, in August 1990, submitted untimely comments asking EPA to again consider the use of the U/B Model. These comments were followed in the December 1990 comments Johnson Controls submitted pursuant to the Order, which also contains an extended discussion on the application of the U/B Model. U.S. EPA has rerun the current version of the U/B Model (version 4.0) using currently acceptable toxicological parameters (Exhibit A); the data is included in this presentation. It can be seen that with a 500 ppm soil cleanup level in Granite City, the current version of the model indicates that greater than 5%

of the children will still exceed an acceptable blood lead level of 10 ug/dl. The 10 ug/dl cut-point was previously discussed in EPA's letter to representatives of Johnson Controls dated September 14, 1990.

U.S. EPA has also evaluated the use of the U/B Model based on different guidelines currently being discussed at EPA Headquarters; the 500 ppm cleanup standard is the least stringent acceptable cleanup standard under these guidelines. A closer look at EPA's risk assessment approach used for other chemicals at Superfund sites reveals that allowing 5% of the population to suffer from lead poisoning may not be acceptable and clearly is not consistent with the 10^{-6} risk approach generally employed by the Agency. Region V anticipates formal guidance on the use of the U/B Model which adopts an approach to the assessment of risk at lead sites which is consistent with the risk assessment approach for other chemicals at Superfund sites. Official Superfund guidance may soon stipulate that 99.5% of the exposed children in lead-contaminated Superfund sites must maintain blood-lead levels below 15 ug/dl rather than requiring 95% of the children to measure less than 10 ug/dl. This curve is also included as Exhibit B. Under either scenario at the NL/Taracorp Superfund Site, however, the 500 ppm lead cleanup level selected for the Site is appropriate and the maximum allowable level to prevent undesirable health effects in the children living in this area.

U.S. EPA disagrees that the prediction of children's blood lead levels for Granite City need to be verified by a complete blood lead/environmental lead study. It is not U.S. EPA's intent nor is it practical to validate the U/B Model at every Superfund site. The purpose of the model is to eliminate the need for biological screening at every site. EPA does believe that blood lead studies are a desirable and needed tool to identify children who may need medical and/or follow-up intervention in areas where severe lead poisoning is common. It is emphasized that biological monitoring is <u>not</u> required for other chemicals of concern at Superfund sites and that the approach advocated by Johnson Controls is inconsistent with EPA policy. Most Superfund sites do not offer the possibility to obtain unbiased, statistically significant measurements of blood lead levels. One of the main reasons for doing biological monitoring is to determine the range of blood lead levels in the childhood population. The geometric standard deviation (GSD) used to calculate the blood lead distribution in the U/B Model (1.42) has been found to be too low in many cases, thus causing the blood lead predictions to be too low.

It should be further noted that a blood lead study was done by the Illinois Department of Public Health (IDPH) in Granite City in 1982. Blood lead levels for 35 children between the ages of 1 and 7 were reported: Twenty of the 35 children (20/35) (57%) had PbB levels $\geq$ 10 ug/dl; 10/35 (29%) were $\geq$ 15 ug/dl and 3/35 (8.6%) were > 25 ug/dl. Comments on Exhibit B, page 19 of

the comments submitted by Johnson Controls would tend to indicate that these blood lead levels are not of concern. As discussed above, EPA disagrees with this assertion. TRC also fails to recognize that deposited smelter dust could represent a threat forever until removed.

It is the best professional judgement of U.S. EPA, Region V, based on available literature and site specific information, that a soil clean-up level of 500 ppm is the maximum acceptable level for the residential NL/Taracorp Superfund site. The approach taken by TRC appears to be to criticize and invalidate virtually every study conducted by experts which may be utilized in determining an acceptable soil-lead level. As TRC points out in its extensive criticism of the bulk of the lead literature--it is difficult to do a perfect study. EPA, however, questions the usefulness of the TRC approach of criticizing virtually every study that has been conducted and also questions the qualifications of the individuals who prepared the comments for Johnson Controls. Johnson Controls does not list the authors' credentials in its comments. EPA has conducted a literature search and was unable to document any previous articles on lead remediation by the authors, who apparently are being relied upon as experts who can credibly attack the validity of existing lead studies. TRC's assertions that only pure matched data should be examined to look at the relationship between environmental lead and blood lead is inconsistent with the approach taken by EPA and most researchers. EPA, in reaching a cleanup decision, examined

a variety of documents which presented different viewpoints. The TRC approach indicates a result oriented bias which is evident in TRC's willingness to dispose of data which does not suit its conclusions and support its conclusions.[2]

An additional topic discussed at the December 21 meeting and presented in comments submitted pursuant to the order was the suggestion that EPA consider an alternate remedy at the site. NL Industries, Johnson Controls, and a number of other order recipients stated a preference for tilling contaminated soil at the site rather than excavating the soil and replacing it with clean soil.

NL Industries was represented by Mr. Steven Tasher. Mr. Tasher stated his belief that tilling should be considered as a remedy. However, Mr. Tasher was unable to explain why NL did not consider tilling while conducting the feasibility study for the Site. NL was also represented at the December 21 meeting by a paid technical consultant from Environ. The consultant,

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[2] TRC's apparent willingness to mold its arguments to a desired conclusion also appears in other portions of its presentation. For example, TRC states that "lead in soil is, at most, a weak contributor to children's blood lead. "TRC Investigation, December 1990, p.iii. However, TRC also states that ". . . soil and house dust are far and away the dominant influence on children's blood concentrations . . ." and that "soil and house dust were the overwhelming influences on children's blood lead levels" at four smelter sites TRC previously studied. "Adjustments in the lead uptake/Biokinetic Model to predict blood lead levels for children at Granite City," TRC Environmental Consultants, Inc., August 30, 1990, Tab 3, p.iii and p.23. TRC's statements emphasizing the contribution of soil lead to blood lead appear in a document which examines air-lead regulations and concludes that air regulations should not be made more stringent; TRC's statements minimizing the contribution of soil lead to blood lead appear in a document advocating a less stringent soil lead cleanup standard.

however, admitted having no previous experience with tilling remedies and was unable to provide any studies evaluating the effectiveness of tilling as a remedy.

Johnson Controls stated its support of tilling as a remedy and its belief that EPA has mischaracterized tilling as dilution. Regional employees of EPA as well as members of EPA's Environmental Criteria and Assessment Office have reviewed Johnson Controls comments and unanimously agree that tilling is clearly a dilution remedy increasing the volume of contaminated soil.

Only one set of data exploring the results of a tilling project was provided to EPA. The data, provided by Exide and referenced by Johnson Controls, appears to demonstrate that tilling, to some degree, diluted the concentration of lead in the surface soils of industrial property owned by Exide in Alabama. No data were presented indicating the effectiveness of tilling at the Alabama Site in reducing the threat of the contaminants to human health and the environment or the type of soils to which such a technique might be applicable. The documents submitted by Exide indicate that the Alabama project was a private project of Exide's. The State of Alabama made clear in its correspondence with Exide that it was not sanctioning tilling as a remedy sufficient to avoid potential Superfund liability. It is noteworthy that the Alabama project was conducted on industrial property and not residential property.

AT&T submitted comments which also recommend tilling as a potential remedy. Two sources were stated in the comments in support of tilling. First, AT&T states that tilling is the subject of a three year study financed by U.S. EPA in Baltimore Maryland. Mr. Barry Chambers, Program Administrator, Toxics Operations, Maryland Department of the Environment, was contacted to confirm this information. Mr. Chambers stated that he was contacted by a representative of one of the Respondents in this matter and informed that individual that tilling was considered for review in the Baltimore study, but it was concluded that a study of tilling was not worthwhile. Members of the Baltimore project determined that the excavation of lead contaminated soil would be more beneficial than tilling the soil. The decision was reached when it was agreed the excavation of contaminated soil and its replacement with clean soil was more health effective than a tilling remedy. Mr. Chambers also stated that the economic benefits of tilling the soil were suspect. Hard-packed urban soil, according to Mr. Chambers, does not readily lend itself to tilling. Excavation, combined with the replacement of contaminated soil with clean soil, also results in significantly lower levels of lead at the soil surface than reductions which may or may not be achieved by a tilling remedy. TRC did not contact either of the other two cities involved in this soil remediation study -- Boston and Cincinnati.

Boston has reported trying rototilling on residential properties in their study area with poor results due to equipment

failure. The type of equipment needed in residential areas broke down 3-4 times, with the blade breaking in one instance. Their conclusion was that rototilling was not cost effective in residential areas - which are highly compacted and often offer limited areas for access. Hand work was less labor and cost intensive.

Cincinnati reported rototilling one vacant property that met the protocol criteria for tilling. Soil lead levels were reduced to an average level horizontally, but did not yield a reduction by mixing with deeper soils due to the inability to achieve complete mixing through tilling; the property was subsequently excavated. Cincinnati suggests that tilling, removal of soil, mixing in a mixer and respreading of completely mixed soil may offer some alternative to disposal, but this approach is likely to be more costly. (Personal communication with N. Zaremba, Lead Free Kids, Boston; S. Clark, University of Cincinnati; Cincinnati; attendance at the January 22-23, 1991 meeting of the Urban Soil Lead Abatement Demonstration Projects Meeting, Baltimore, MD)

The second item used by AT&T to support its position that tilling is an appropriate remedy is an article by Dr. Robert Elias of U.S. EPA's Office of Research and Development. AT&T states that Dr. Elias is a proponent of tilling. An examination of the article submitted by AT&T, however, reveals that Dr. Elias merely considers tilling conceptually as one method that may be used to reduce concentrations of lead in soil. Dr. Elias

confirmed this interpretation of the article in question in a meeting held January 9, 1991. Dr. Elias stated that he is not a proponent of using tilling as a method of remediating lead contaminated soils in residential soils at Superfund Sites, but merely prepared an article which stated conceptually the various methodologies which could be considered in remediating contaminated soils.

Federal Cartridge submitted documents obtained from the State of Minnesota as the basis for its support of a tilling remedy. The documents state that Minnesota has proposed rules requiring homeowners to dilute lead contaminated soils by tilling the soils. The proposed rules, however, add no evidence to support the applicability or effectiveness of tilling as a means of remediating contaminated soils.[3] The rules proposed by the State of Minnesota are also proposed in a very different context than a Superfund cleanup. Minnesota's proposal places the burden on homeowners to clean the soil and does not address the issue of cleaning soils derived from a known point source of the contamination. CERCLA places the responsibility for cleaning contaminated property with the parties CERCLA defines as responsible for creating the contamination.

Despite any evidence submitted by the Respondents which could provide a sound basis for U.S. EPA to support a pilot study

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[3] The proposed rules cite the apparent support of tilling as a remedy by Mr. Joseph Dufficy of U.S. EPA. Mr. Dufficy was unaware that he was cited in the proposed rules and stated that he does not endorse tilling as a remedy.

of tilling at the Site, the number of commenters raising the issue of tilling prompted regional personnel to further investigate the appropriateness of this remedy. Members of Region V attended a national seminar on the cleanup of lead contaminated residential soils which was held on January 8-9, 1991. The seminar was attended by approximately one hundred individuals working on lead cleanup sites around the country. Attendees included representatives of the U.S. EPA Regions and Headquarters, the U.S. EPA Office of Research and Development, the U.S. EPA Office of Environmental Criteria and Assessment, various states, and others. The entire group was asked whether they had experience or comments on tilling as a form of remediation for lead contaminated soils. Every response to the question stated that the dilution of lead in residential soils through tilling is not a recommended form of remediation. Not a single commenter was aware of the use of tilling to remediate residential soil-lead contamination and no one was willing to endorse tilling as a remedy. Region V also obtained a recent survey of all Records of Decisions which states that no site has adopted this dilution remedy to remediate lead contaminated soils.

The comments received on tilling ignore certain inherent flaws in the use of tilling as a remedy when compared with the excavation of contaminated soils and the replacement of the contaminated soil with clean soil. First, a cleanup as established in the ROD results in clean soils at the surface

rather than soils diluted to somewhere under 500 ppm of lead. Clean soils reduce the exposure levels to the population and excavation removes the contaminated soils from areas of public access. The contaminated soils will be isolated in an area covered with a RCRA compliant cap and a bottom liner. Second, a tilling remedy will result in an increased volume of contaminated soil. One of the nine criteria for evaluating remedial alternatives established by the CERCLA National Contingency Plan (NCP) is "reduction of toxicity, mobility, or volume." Tilling increases the volume (excavation does not) and does not reduce the mobility of lead (the selected remedy reduces airborne mobility by placing contaminated soil under a RCRA cap and backfilling excavated areas with clean soil). If lime is added to tilled soil, it may reduce mobility of lead in the soil; however, this practice is of questionable utility in residential areas and has not been shown to be permanent. Third, the possibility exists that future information concerning the toxicity of lead will require further remediation at the Site. The tilling remedy, by increasing the volume of contaminated soil, may increase the cost of future remediation and be more disruptive to the community. An excavation remedy is anticipated to eliminate the need to return to areas once they are remediated, since the soil used to replace the contaminated soil will already be clean. Fourth, tilling does not remove soils from areas where children have unrestricted access. Even with sod placed over lead contaminated soil diluted by tilling,

observations in the Granite City area indicate that bare patches of soil are not uncommon. Exposed soil, even after tilling, will place children and other individuals at risk. An excavation remedy removes the contamination from areas where children and others will have access.

Based on written comments received and statements made by Respondents at the December 21, 1990 meeting and in subsequent discussions, it appears that there is a misconception regarding the 500 ppm residential lead soil cleanup level. The 500 ppm cleanup level was set by U.S. EPA based on excavation as the cleanup method followed by replacing removed soil with clean soil. Both of these requirements, 500 ppm and excavation, are explicitly stated in the ROD. It is incorrect for the Respondents to view the 500 ppm cleanup level as a standard to be achieved by any available remediation technique. The cleanup standard is 500 ppm, <u>using</u> excavation. In selecting the 500 ppm level, U.S. EPA assumed that clean backfill would be used following excavation to provide a clean surficial layer of soil with very low lead concentrations (approximately 25 ppm). Tilling will not achieve this, and the 500 ppm cleanup level was not selected with tilling in mind. The level would have certainly been significantly lower if tilling were selected as the cleanup method. The proposed use of tilling is clearly inconsistent with the letter and the intent of the ROD. It is also inconsistent with Illinois law, which will be discussed later in this response.

Comments received during the comment period largely ignore site specific factors which must be considered even if EPA was willing to consider an experiment with an untested remediation technique such as tilling. The NL/Taracorp Site in Granite City will require the removal of lead contaminated soil at a large number of residences. An experiment on the short and long term effectiveness of a tilling remedy is best conducted on industrial property or an area with no or minimal access to children. The area the Respondents propose for tilling, however, is a residential community with unrestricted access and a large number of people. Region V at this time does not consider such an area appropriate for experimenting with tilling as a remediation alternative at a Superfund Site.

Even if U.S. EPA was to consider the dilution of soil through tilling as a remedy, the tilling alternative proposed by Respondents is not a proper remedial alternative in the State of Illinois. Section 121(d)(2) of CERCLA, as amended, requires that remedial actions must at least attain Federal and more stringent State applicable or relevant and appropriate requirements (ARARs) upon completion of the remedial action. The Illinois Lead Poisoning Prevention Act, Ill. Rev. Stat. ch. 111 1/2, par. 1301 et seq., as implemented by the Illinois Administrative Code, Part 845, defines the permissible limits of lead in soil at section 845.50. The permissible limit for lead in soil which is readily accessible to children under age 16 is 200 micrograms of lead per gram of soil. Section 845.30 states that lead hazards must be

removed or permanently covered. The remedy selected by U.S. EPA and IEPA will remove the lead contamination greater than 500 ppm through excavation and cover remaining lead with clean soil. A tilling remedy neither removes the soil or permanently covers the soil. Tilling would leave the property owner out of compliance with the Illinois Lead Poisoning Prevention Act and, by increasing the volume of contaminated soil, will actually increase the burden on the property owner who attempts to comply with the Lead Poisoning Prevention Act. Representatives of the Illinois Department of Health have been consulted and agree with U.S. EPA's interpretation of the Lead Poisoning Prevention Act. U.S. EPA considers this act an ARAR that must be complied with in remediating the Granite City Site.

U.S. EPA has reviewed the comments received regarding the order and the selected response action. It is U.S. EPA's determination that the response actions the Respondents are ordered to comply with are necessary and appropriate actions under CERCLA to protect human health and the environment.

ADDED REFERENCES

CDH 1990, Leadville Metals Exposure Study, Colorado Department of Health, University of Colorado at Denver and Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services, 1990.

MPCA 1987, Soil Lead Report to the Minnesota State Legislature, A Statement by the Minnesota Pollution Control Agency and the Minnesota Department of Health, MN, 1987.

USEPA 1990a, Technical Support Document on Lead, ECAO-CIN-757, Environmental Criteria and Assessment Office, U.S. Environmental Protection Agency, Cincinnati, OH, 1990.

USEPA 1990b, Users Guide for Lead: A PC Software Application of the Uptake/Biokinetic Model Version 0.40, First Draft, Environmental Criteria and Assessment Office, U.S. Environmental Protection Agency, Cincinnati, OH, 1990.

USDHHS 1990, Toxicological Profile for Lead, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 1990.

Review of Soil-Lead Records of Decision

Review of the selected remedy at the Marjol Site, Throop, Pennsylvania

Region X Contractor reports, November 16, 1990 and November 29, 1990.[4]

State of Ohio letters on soil lead cleanup levels.[5]

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[4] This document is not releasable at the present time, but may be available in the future.

[5] This document represents inter-agency correspondence not presently releasable.

ABSORPTION METHODOLOGY: Non-Linear Active-Passive

* AIR CONCENTRATION: 0.260 ug Pb/m3

Indoor AIR Pb Conc: 30.0 percent of outdoor.

Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 4.00 ug Pb/L

WATER Consumption: DEFAULT

* SOIL & DUST:

Soil: constant conc.

Dust: constant conc.

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	500.0	500.0
1-2	500.0	500.0
2-3	500.0	500.0
3-4	500.0	500.0
4-5	500.0	500.0
5-6	500.0	500.0
6-7	500.0	500.0

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model

Maternal Blood Conc: 7.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	5.90	18.39	15.00
1-2:	5.67	19.04	14.99
2-3:	5.58	19.59	14.99
3-4:	5.65	19.50	14.98
4-5:	5.83	19.43	14.97
5-6:	5.84	19.74	14.96
6-7:	5.83	20.11	14.95

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.94	0.40	0.00	0.05
1-2:	2.96	1.00	0.00	0.09
2-3:	3.39	1.04	0.00	0.16
3-4:	3.28	1.06	0.00	0.17
4-5:	3.18	1.10	0.00	0.17
5-6:	3.37	1.16	0.00	0.24
6-7:	3.74	1.18	0.00	0.24

* Site-specific or target values incorporated.

EXHIBIT A

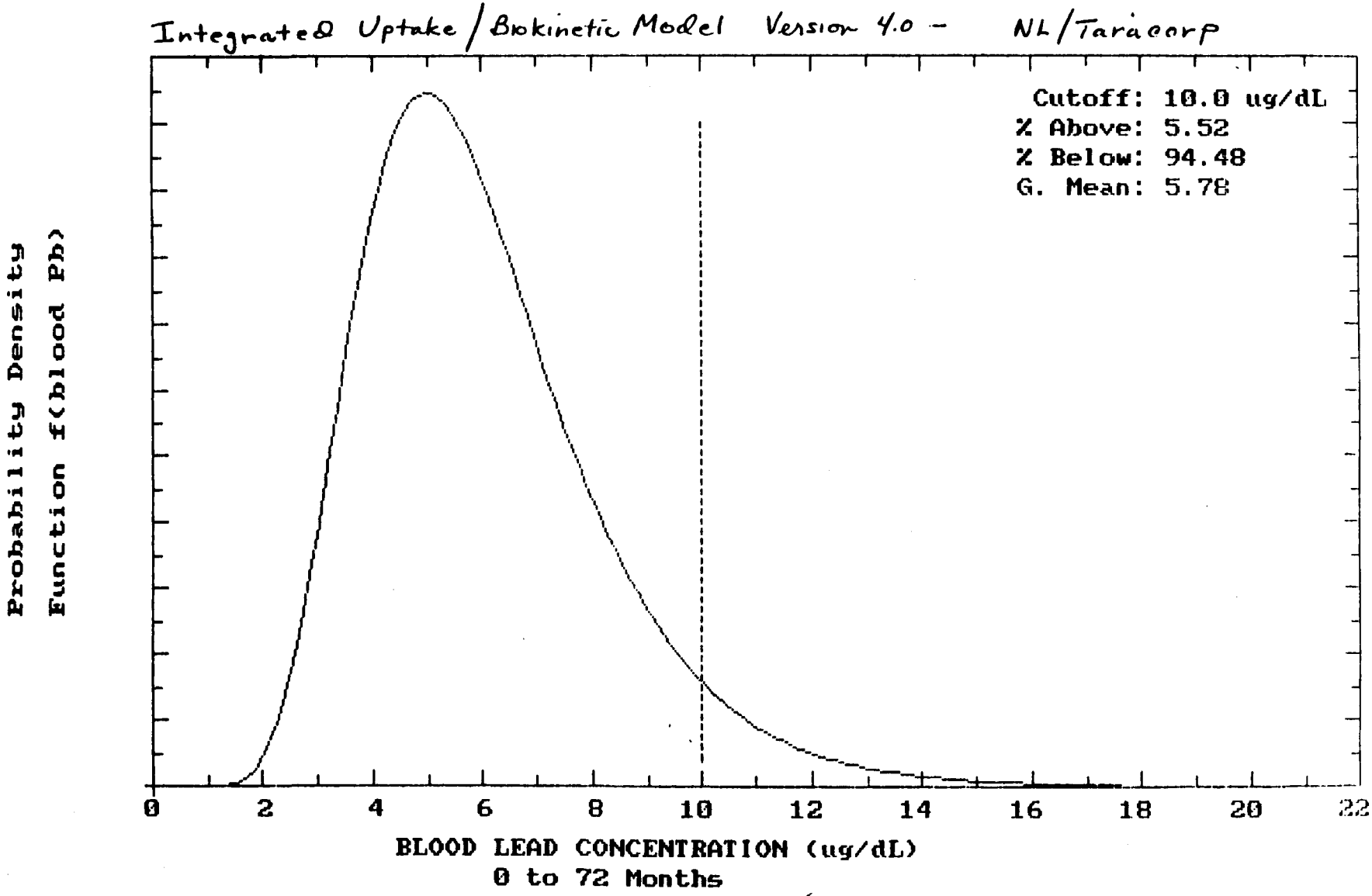
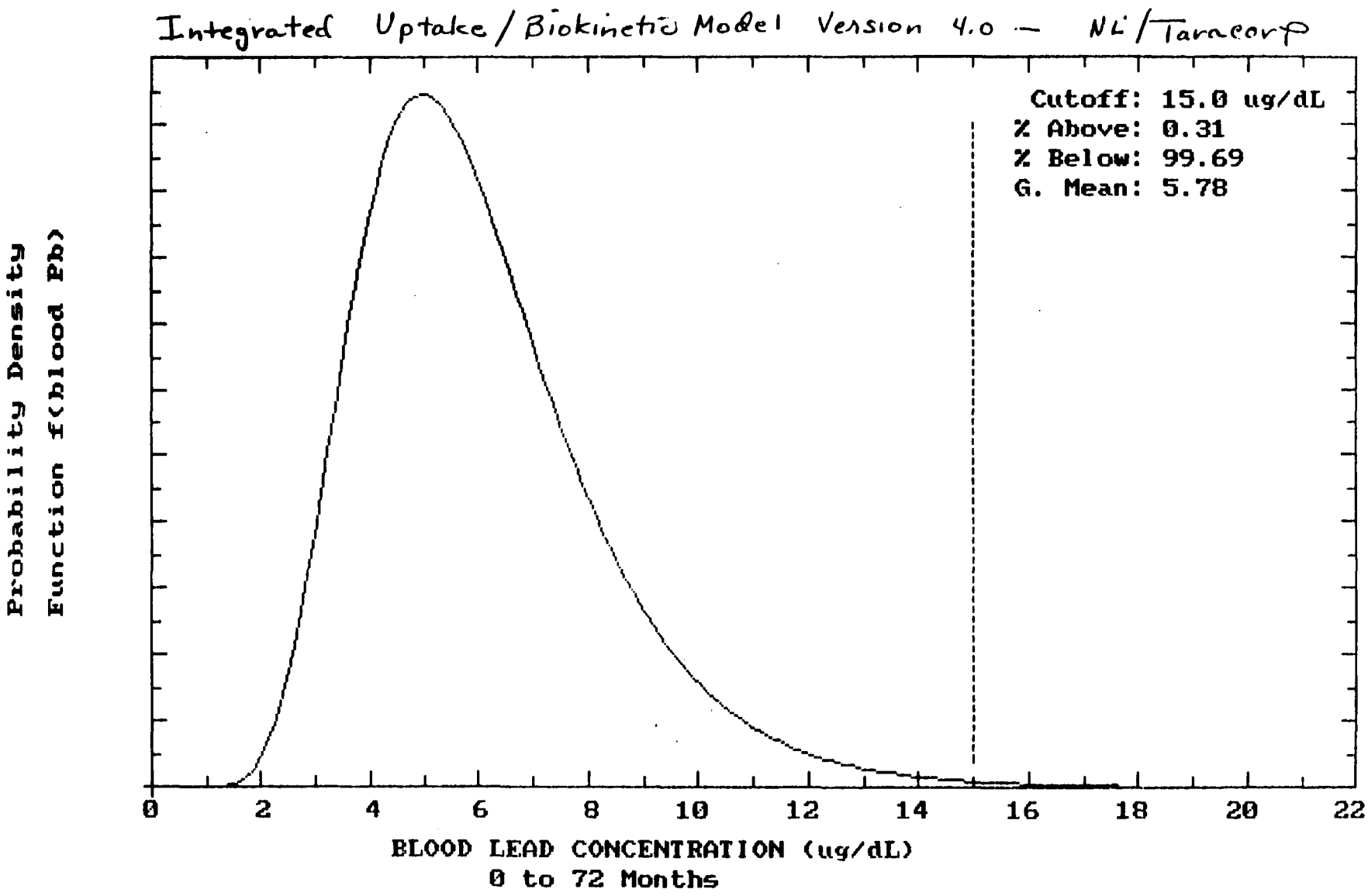

Integrated Uptake/Biokinetic Model Version 4.0 - NL/Taracorp
Cutoff: 10.0 ug/dL
% Above: 5.52
% Below: 94.48
G. Mean: 5.78
Probability Density
Function f(blood Pb)
0
2
4
6
8
10
12
14
16
18
20
22
BLOOD LEAD CONCENTRATION (ug/dL)
0 to 72 Months

Exhibit B


Integrated Uptake/Biokinetic Model Version 4.0 — NL/Tetracorp
Cutoff: 15.0 ug/dL
% Above: 0.31
% Below: 99.69
G. Mean: 5.78
Probability Density
Function f(blood Pb)
0
2
4
6
8
10
12
14
16
18
20
22
BLOOD LEAD CONCENTRATION (ug/dL)
0 to 72 Months

ABSORPTION METHODOLOGY: Non-Linear Active-Passive

* AIR CONCENTRATION: 0.260 ug Pb/m3

Indoor AIR Pb Conc: 30.0 percent of outdoor.

Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 4.00 ug Pb/L

WATER Consumption: DEFAULT

* SOIL & DUST:

Soil: constant conc.

Dust: constant conc.

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	550.0	550.0
1-2	550.0	550.0
2-3	550.0	550.0
3-4	550.0	550.0
4-5	550.0	550.0
5-6	550.0	550.0
6-7	550.0	550.0

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model

Maternal Blood Conc: 7.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	6.33	19.89	16.50
1-2:	6.11	20.54	16.49
2-3:	6.01	21.08	16.48
3-4:	6.08	20.99	16.47
4-5:	6.27	20.92	16.46
5-6:	6.28	21.22	16.45
6-7:	6.27	21.59	16.43

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.94	0.40	0.00	0.05
1-2:	2.96	1.00	0.00	0.09
2-3:	3.39	1.04	0.00	0.16
3-4:	3.28	1.06	0.00	0.17
4-5:	3.18	1.10	0.00	0.17
5-6:	3.37	1.16	0.00	0.24
6-7:	3.74	1.18	0.00	0.24

* Site-specific or Target Values Incorporated.

Exhibit A2

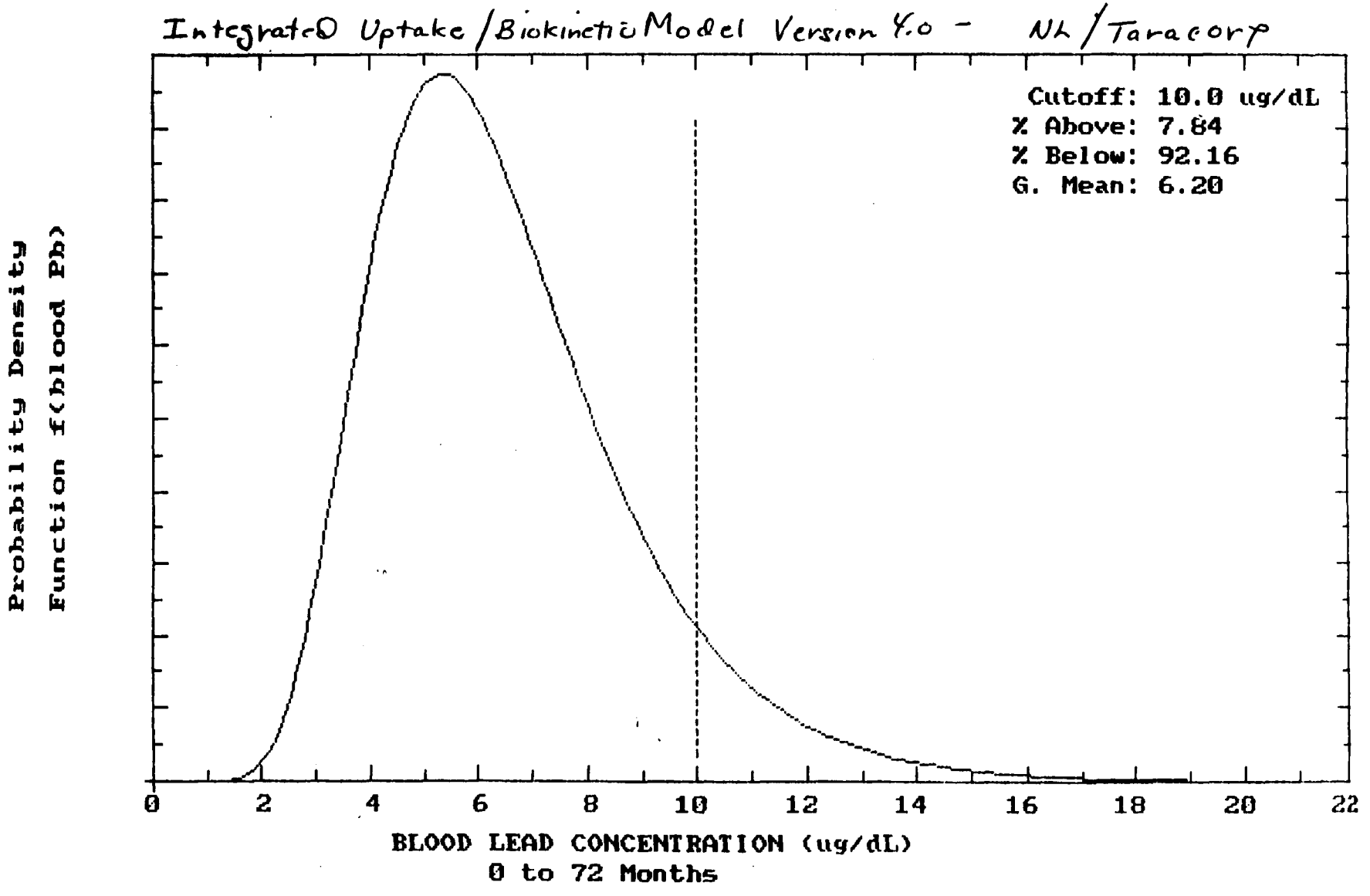
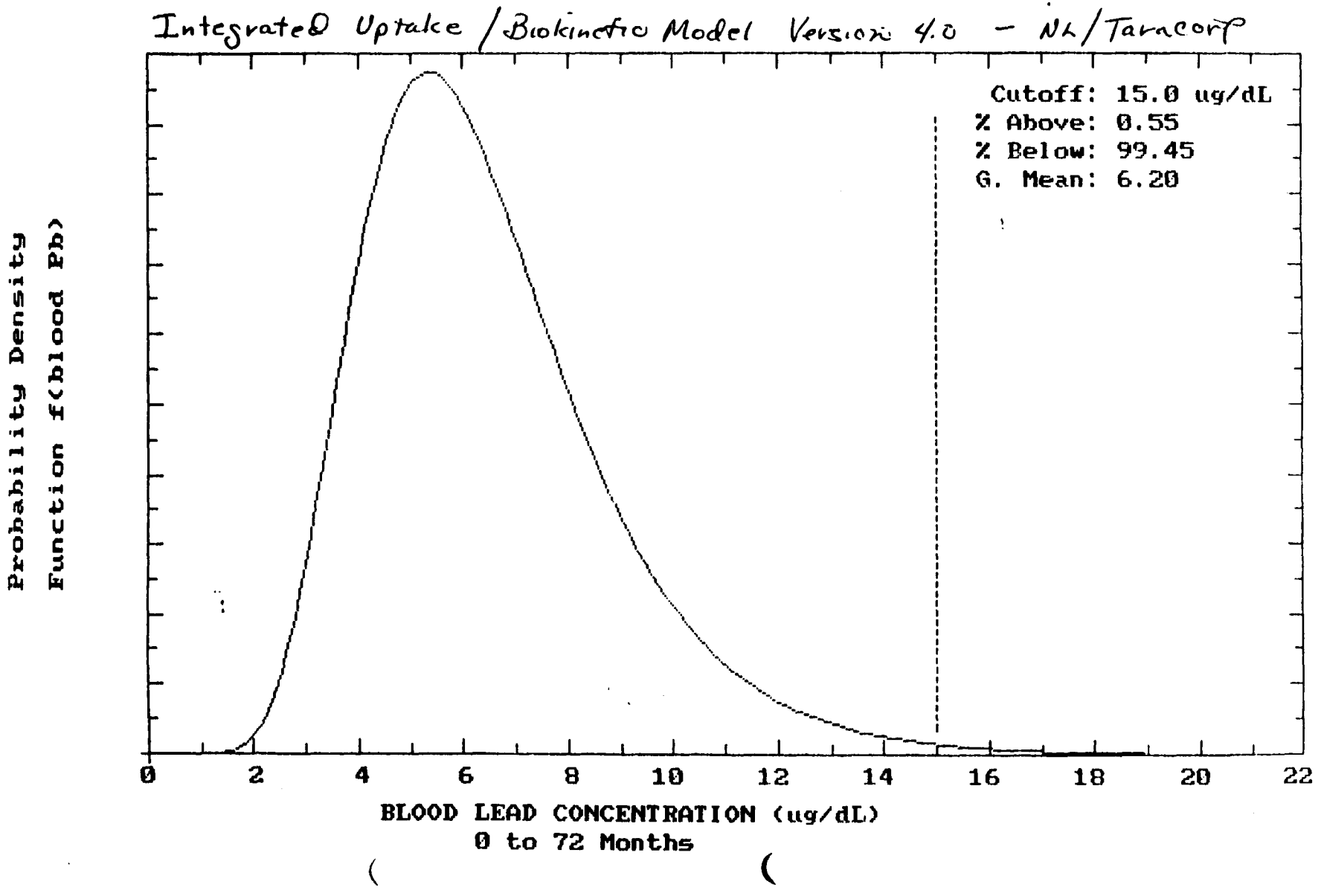

Integrated Uptake/Biokinetic Model Version 4.0 - NL/Tetracorp
Cutoff: 10.0 ug/dL
% Above: 7.84
% Below: 92.16
G. Mean: 6.20
Probability Density
Function f(blood Pb)
0
2
4
6
8
10
12
14
16
18
20
22
BLOOD LEAD CONCENTRATION (ug/dL)
0 to 72 Months

Exhibit B2


Integrated Uptake / Biokinetic Model Version 4.0 - NL/Taracorp
Cutoff: 15.0 ug/dL
% Above: 0.55
% Below: 99.45
G. Mean: 6.20
Probability Density
Function f(blood Pb)
0
2
4
6
8
10
12
14
16
18
20
22
BLOOD LEAD CONCENTRATION (ug/dL)
0 to 72 Months